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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/777,973

02/11/2004

Yunlong Sun

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7445

7590

01/03/2006

Sandra K. Szczerbicki
Suite 2600
900 SW Fifth Avenue
Portland, OR 97204-1268

EXAMINER

ELVE, MARIA ALEXANDRA

ART UNIT

PAPER NUMBER

1725

DATE MAILED: 01/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/777,973

Applicant(s)

SUN ET AL.

Examiner

M. Alexandra Elve

Art Unit

1725

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 October 2005.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-23 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 11 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant claims rapid removal of target material while retaining dimensional stability of the target material.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 4-5, 8, 11-23 are rejected under 35 U.S.C. 102(b) as being anticipated by Cordingley et al. (USPAP 2002/0167581).

Cordingley et al. discloses an improved thermal based laser method for processing a predetermined microstructure formed on a substrate without causing undesirable changes in electrical and physical characteristics of the substrate or other

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structures formed on the substrate. Multi-material and layered materials and wafers are processed. Copper links are removed on multilevel devices. Additionally, microscopic holes can be drilled. Laser processing is thermal based. The laser energy used is about 60 to 70% of laser energy required for laser processing.

A q-switched pulse laser may be used, as well as a mode-locked system. Fiber amplification is an option. IR, UV and green spectrum lasers are used to blow copper links. Wavelengths may be chosen based on the substrate properties, with the typically value being 1.047 μm . Repetition rates range from 1uHz to 20KHz to 60 MHz (mode lock system). Beam spot, pulse width, energy pulse values are all selected to ensure optimal processing. Pulse widths of less than 5 nanoseconds are used (few picoseconds to nanoseconds). In order to limit thermal diffusion and hence negate substrate damage, pulse energies range from 0.1 microjoules to 3 microjoules. The position and depth of focus of the beam is selected to ensure that the substrate is processed without creating undesirable changes to other materials. Additionally, the system normalizes the defocus function. Figure 15a shows the focusing optics and beam guidance. (abstract, figures, 0005, 0007, 0009, 0016, 0024-0029, 0034, 0036, 0046, 0057-0058, 0083-0091, 0095-0096, 0106, 0109, 0112-0113, 0115, 0117-0120, 0122, 0125-0126, 0134, 0137-0152, 0165, 0190, 0193, 0195-0196, 0198, 0200-0201, 0204, 0210, 0220-0221, 0226)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cordingley et al., as stated in the above paragraph and further in view of Owen et al. (USPN 5,841,099).

Cordingley et al. teaches drilling holes, but not blind vias.

Owen et al. discloses the use of a q-switched laser to drill vias and blind vias in multilayer materials (metallic and dielectric layers). (abstract)

It would have been obvious to one of ordinary skill in the art at the time of the invention to drill blind vias, as taught by Owen et al. in the Cordingley et al. system because this is merely a specific type of hole drilling.

Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cordingley et al., as stated in the above paragraph and further in view of Fahey et al. (WO 03/002289 A1).

Cordingley et al. discloses the processing of wafers but not dicing.

Fahey et al. discloses the dicing of wafers using an IR laser with differing wavelengths. (abstract)

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It would have been obvious to one of ordinary skill in the art at the time of the invention to dice wafers, as taught by Fahey et al. in the Cordingley et al. system because it is merely a specific type of wafer processing.

Claims 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cordingley et al. as stated in the above paragraph and further in view of the following.

Cordingley et al. teaches a range of wavelengths, which are selected, based on the processing operations needs. It is well settled that where patentability is predicated upon a change in a condition of prior process, that is, the wavelength, the change must be at least critical, that is, it must lead to a new and unexpected result. The applicant has the burden of providing such proof of criticality. Note In re Aller et al. 105 USPQ 223.

Response to Arguments

Applicant's arguments filed 10/17/05 have been fully considered but they are not persuasive.

Applicant argues that the prior art does not disclose an increase in throughput, that is, rapid processing. The examiner respectfully disagrees because the pulse widths of less than 5 nanoseconds are used (few picoseconds to nanoseconds), which are ultrafast processing. Additionally, "an increase in throughput" is not disclosed in applicant's instant claims.

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Applicant argues that prior art does not disclose an application of heat energy. The examiner respectfully disagrees because Cordingley et al. discloses an improved **thermal** based laser method for processing a predetermined microstructure formed on a substrate without causing undesirable changes in electrical and physical characteristics of the substrate or other structures formed on the substrate.

Additionally, applicant argues that the prior art does not teach rapid removal of target material while retaining dimensional stability of the target material. The examiner notes that this is an indefinite statement and has been dealt with in a 112 rejection. Although this claim limitation is indefinite, the examiner respectfully notes that Cordingley et al. discloses a method for processing a predetermined microstructure formed on a substrate without causing undesirable changes in electrical and physical characteristics of the substrate or other structures formed on the substrate, that is the substrate is not altered. Pulse widths of less than 5 nanoseconds are used (few picoseconds to nanoseconds).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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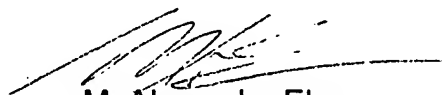
TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. Alexandra Elve whose telephone number is 571-272-1173. The examiner can normally be reached on 6:30-3:00 Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

December 27, 2005.


M. Alexandra Elve
Primary Examiner 1725